



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/955,432	09/19/2001	Tatsuya Maruo	0171-0784P-SP	9441

2292 7590 07/06/2006

BIRCH STEWART KOLASCH & BIRCH
PO BOX 747
FALLS CHURCH, VA 22040-0747

EXAMINER

WALKER, KEITH D

ART UNIT	PAPER NUMBER
----------	--------------

1745

DATE MAILED: 07/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.		Applicant(s)	
	09/955,432		MARUO ET AL.	
	Examiner		Art Unit	
	Keith Walker		1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 April 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 7-9, 11-14 and 16-19 is/are pending in the application.
- 4a) Of the above claim(s) 13, 14, 16 and 17 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 7-9, 11, 12, 18 and 19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Art Unit: 1745

DETAILED ACTION

Remarks

Claims 7-9, 11-14 & 16-19 are pending in the application. Claims 13, 14, 16 & 17 are withdrawn.

Claims 7-9, 11, 12, 18 & 19 are pending examination.

Due to amendments, the Claim Objections are withdrawn.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

1. Claims 7, 8, 9 & 18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The meaning of residue is unclear as a limitation and is unsupported by the specification.
2. Claims 7, 8, 9 & 18 recites the limitation "the residue". There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 1745

3. Claims 7-9, 11, 12, 18 & 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 5,558,959 (Venugopal) for essentially reasons of record.

Venugopal discloses polyurethane gel electrolyte systems. The electrolyte system includes an organic support structure and a liquid electrolyte absorbed by the organic support structure, (3:8-12) and is disposed between the anode and the cathode (Fig. 1). The electrolyte is therefore used as a separator. The organic support structure may be a segmented block copolymer. An example of an inventive block copolymer is polyurethane thermoplastic which is a copolymer of a short-chain diisocyanate and a polyester diol (3:8-44). An example of polyester diol usable in the invention is polycaprolactone, which corresponds to applicants' formula (1). (See Venugopal 4:18-29 and Chemical Abstracts RN 25248-42-4.)

Furthermore, the limitation addressing the preparation of the thermoplastic polyurethane resin is seen as a product-by-process and even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. "The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." (MPEP 2113)

The polyurethane/liquid electrolyte system disclosed by Venugopal may be mixed with cathode powders to form composite cathodes (6:51-63). Since the liquid electrolyte has been absorbed by the polyurethane support structure, the cathode powder is effectively mixed with a gel material containing a polyurethane polymer and a

Art Unit: 1745

liquid electrolyte. The mixture of cathode powder and electrolyte gel forms a "composite cathode" and in such situations the polymer electrolyte acts as the active material binder. As evidence, see the discussion by Lamanna et al., US Patent 5,652,072 (6:47-61).

The block copolymer used for the electrode can be a combination of polyurethane and polyester (6:18-22).

In a preferred embodiment, a film containing 0.5 grams of polyester/polyurethane resin and 2.0 g of a 1M solution of electrolyte is described (Column 7, Example 1). Therefore, a solution containing 20 wt% resin is described.

In a preferred embodiment, Venugopal discloses forming a polyurethane film by compression molding and subsequently soaking the film in a 1 M solution of lithium tetrafluoroborate dissolved in propylene carbonate. This process clearly swells the polyurethane film (8:15-26).

The disclosure of Venugopal differs from applicants' invention in that Venugopal does not recite a specific amount of swelling which occurs after 24 hours and instead describes the swelling occurring after soaking a specific embodiment for 48 hours. Venugopal describes an inventive polyurethane film soaked for 48 hours to contain about 63% liquid electrolyte (8:20-22). Therefore, 37% of the soaked film is polyurethane and is the original weight of the film. The swelling ratio after 48 hours is $100/37 \times 100$ or about 270%.

Venugopal notes that with increasing wt% of the liquid electrolyte material (in the gel electrolyte) the conductivity similarly increases. Thus, the swelling ratio of

Art Unit: 1745

polyurethane film is a result effective variable and it would be within the skill of the ordinary artisan to adjust the amount of swelling of the polyurethane film which occurs in 24 hours in order to adjust conductivity of the film.

Venugopal describes an electrolyte system using a block copolymer containing polycaprolactone, which corresponds to applicants' formula (1) with the exception that the number of repeating units in the polymer segment is not mentioned (4:18-29). However, Venugopal suggests polyester diol segments with relatively high molecular weights should be used. (4:10-14). One of ordinary skill in the art would interpret this teaching to include polymer segments with more than 5 repeating units.

4. Claims 7-9 & 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 5,558,959 (Venugopal) in view of US patent 6,372,388 (Katsurao).

The teachings of Venugopal as discussed above are incorporated herein.

As discussed above, Venugopal disclose applicants' invention with the exception that Venugopal do not include fluoropolymers as binder thermoplastic resins.

Katsurao discloses blending a polyvinylidene fluoride copolymer or a mixture of a polyvinylidene fluoride and another resin with an organic solvent and a powdery electrode material to form an electrode. (6:60 – 7:4). The polyvinylidene fluoride is thus a binder material. The electrolytes used include ethylene carbonate, diethyl carbonate, dimethyl carbonate, propylene carbonate and combinations thereof (Venugopal column 3, lines 15-35). The mixture for the electrolyte would have a freezing temperature above the glass transition temperature of the vinylidene fluoride.

The vinylidene fluoride material is taught to improve the retentivity of powdery electrode materials, the ionic conductivity and the heat resistance in polymer batteries. (16:35-47). Thus, it would have been obvious to one of ordinary skill in the art to include the polyvinylidene fluoride material taught by Katsurao in order to improve the retentivity of powdery electrode materials, the ionic conductivity and the heat resistance in polymer batteries taught by Venugopal.

Response to Arguments

Applicant's arguments filed 4/13/06 have been fully considered but they are not persuasive.

Applicant argues Venugopal does not teach a thermoplastic resin which is prepared by reacting a polyol compound with a number average molecular weight with a polyisocyanate and a chain extender. As stated above, this is seen as a product-by-process claim and as such, "The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process."

Applicant argues the improvement to the low temperature properties would not be expected by modifying the polyurethane compositions of Venugopal with the high temperature resistant PVDF of Katsurao. The fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). Even

Art Unit: 1745

though the reasons for combining the PVDF of Katsurao with the polyurethane of Venugopal are not the same as applicant, the motivation taught by Katsurao to improve the retentivity of powdery electrode materials and the ionic conductivity still exists. The fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability. An improvement in high temperature resistance does not detract from the teaching of adding the polyvinylidene fluoride to improve the retentivity of the powdery electrode materials and the ionic conductivity. The material characteristics of polyvinylidene fluoride allow the glass transition temperature to be less than the freezing temperature of the electrolyte as presented above. Furthermore, applicant argues unexpected results; however, "a showing of unexpected results must be based on evidence, not argument or speculation" (MPEP 2144.08).

Applicant argues Venugopal does not teach a binder made by combining polyurethane with a polyether. As discussed above, the block co-polymers include combinations of polyurethanes and polyethers (6:15-25).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

Art Unit: 1745

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Keith Walker whose telephone number is 571-272-3458. The examiner can normally be reached on Mon. - Fri. 8am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KW


PATRICK JOSEPH RYAN
SUPERVISORY PATENT EXAMINER